OTS: 60-11,929 JPRS: 5028

18 July 1960

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Distributed by:

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WASHINGTON 25, D. C.

U. S. JOINT PUBLICATIONS RESEARCH SERVICE
205 EAST 42nd STREET, SUITE 300
NEW YORK 17, N. Y.

JPRS: 5028

CSO: 3928-N/e

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[This is a translation of an article by Huan Ping-wei, which appears in K'o-hsueh T'ung-pao (Scientia), No 18, 26 September 1959, pages 594-602.]

A composite natural region is classified in terms of such factors as similarities and differences of natural phenomena on the earth's surface; each classified unit becomes a base for the investigation of the characteristics, occurance, development and distributional regularity of the composite region. In recent years, the Committee On Natural Region Classification of the Chinese Academy of Science has organized science workers in the fields of meteology, soil science, botany and physical geography to draw up a plan of composite natural regions for the main purpose of utilization of soils and water. The primary task in regional classification is to establish a unit system consistent with our aim. First, we compared analytical, distributional and regional maps, and explored the interrelationships between the natural factors in order to comprehend the over-all look of areal differentiation of the composite regions.

Since there exists numerous phenomena and boundary lines, and continuous processes in nature, it is thus necessary to select the parts which have more significant bearing upon regional classification. On the one hand, the task should establish certain connections with the regions of Asia and the whole world, so as to understand the areal differentiation of the land surface of China from a broader viewpoint. By so doing, we may achieve a complete understanding of the physical environment of China, and utilize to certain degree foreign scientific findings and experiences in economic development in regions similar to ours. On the other hand, we must keep in mind peculiarities of China's

natural environment, of which there are five outstanding ones, as follows: 1. Monsoon and Tibetan Plateau, which brought a basic change in atmospheric circulation in our country, and which control our climatic patterns and their distribution. 2. China's land base has experienced great disturbances several times since the Cambrian epoch, and some of the paleozoic geosynclines were hardened in the process of later mountain movements. 3. The topography of China is composed of a complex of plateaus, mountains, and hills which occupy a great portion of the land. Horizontal land surfaces and vertical land surfaces are intermingled in their distribution. The horizontal land surface has a higher degree of regulation than the vertical ones. In the classification of natural regions these two should be combined in one unit system. A concrete method must thus be found to give a good indication of the horizontal land surface and to show the vertical land surface also. 4. In China, natural vegetation and animals are numerous and intermixed in their species, and complicated in distribution. Quarternary glaciation was far more limited than in the same latitudes in Europe. The ancient weathered red rock materials may be seen as far as in Great Khingan Mts. The present soils are partly residual. 5. During the long history of China intensive changes in the natural environment have taken place due to human activities. Since similarities and differences of regional classification are relative, we chose to use a multi-rank system. From a higher rank to a lower rank of this classification, the interior similarities of each classified unit increase gradually. Terms of classified units from higher rank to lower rank in this system of classification are as follows:

Natural Region (no rank)
Energy Belt and Sub-belt (no rank)
Natural Geographic Region and Sub-Geographic Region (first rank)
Natural Geographic Belt and Sub-Geographic Belt (second rank)
Natural Province (third rank)
Natural Area (fourth rank)
Natural Section (fifth rank)

The formation of peculiarities in each composite natural region always involves local or non-local, external, and internal, present and historical factors. This, however, does not imply that all these factors should be given equal consideration in classifying a unit of any rank. The primary basis for classification in each rank varies accordingly.

In the system we adopted, principles of biology and climate are followed to the classification of the third rank, which shows the units classified on the basis of relationships between climate and soils, biology, and agriculture, thus the boundaries are drawn. Principles which are mainly considered are horizontal and vertical land surfaces. The classification of the Natural Province is basically an expression of the principle of the vertical land surface. The expression of the horizontal land surface may be seen in the basic divisions of belt, sub-belt, geographic region, sub-geographic region, geographic belt and sub-geographic belt. In different Natural Regions, the display of horizontal land surface varies. Since major factors in regional classification differ, the classification of Natural Regions may be, therefore, interpreted as one process in recognizing the horizontal land surface within a Natural Province. The difference is a local factor, which is chiefly determined by such non-geographic belt factors as land surface, geological structure and characteristics of rocks, soil temperature and soil moisture, surface water, and underground water. All these factors are the basis for the classification of a Natural Area and a Natural Section. In some places, the following supplementary principles were adopted in the process of classifying regions:

1. The characteristics and the developing characteristics of nature may be stressed as used mainly for classifying higher ranks; meanwhile, the remaining characteristics may be the basis for classifying the lower ranks.

2. In the classification of the higher ranks, we may chiefly concerned with natural conditions that are impossible or very hard to change, while conditions easily changed may be the basis for classification of the lower ranks. 3. The primary basis may be a general index (e.g. average value over a number of years) in classification of the higher ranks, whereas for the lower ranks a specific index (e. g. of yearly rate of change of seasonal change) may be mainly stressed. In the following sections, definitions of units in the various ranks, and methods for practical classifications will be discussed. Within the unit of each level, energy reflects local differentiation as well as differences in certain natural phenomena and agricultural conditions induced by the local difference. It may have significant meaning as far as scientific knowledge and practices are concerned, but it nevertheless cannot represent a definite natural complex body. Its classification is a process in regional classification, and also a process in relating

Asiatic classification with that of the world. The chief aim of natural regional classification is to group numerous unit areas of similar natural phenomena, and also to link up with the regional systems of Asia as well as the world; on the other hand, it is a method of helping our understanding of the energy belt, that in different natural regions they bear different meanings. Therefore, the Natural Region and the Energy Belt are not considered to be first rank; instead, the Natural Geographic Region is the first rank. The fact that Belt and Sub-belt, Geographic Region and Sub-geographic Region, Geographic Belt and Sub-geographic Belt, are all classified into one rank is to reduce the number of ranks for convenience of application.

II. On the basis of the primary main differences in natural conditions in China, the whole country may be divided into the East Monsoon Region, the Mongolia-Singkiang Plateau, and the Tsing-hai-Tibetan Plateau. The main natural characteristics of the three regions may be listed as Figure 1.

From this Figure, the basis for classifying these three regions is: 1. The existing topography is different from the movement of new structures. 2. The major factors which the areal differentiation of complex natural regions has to obey are different. 3. The major characteristics of climate are different and consequently so are the soils, vegetation cover, and hydrography. 4. The processes of development of nature (soils, biology, geology and topography) are different. 5. The factors of human influence upon the nature and the directions of man's use of the land are different. The differences among regions thus become very obvious. In trying to classify a vast regional development, the distribution of all factors taken into consideration cannot possibly be totally consistent, and even the consistency within one region may be very different. Some boundaries therefore can only roughly indicate the places where changes have begun in nature.

III. According to the geographical difference in energy as well as its effect upon the total natural world, six energy belts and sub-belts may be divided in China. The main reference index of classification of the belt and sub-belt is the total sum of temperature. We thus determine a general index for the classification of the belt and sub-belt on the basis of isorithmic lines of the total sum of temperature and general relationship between soils, vegetation cover and agricultural distribution. In determining a boundary, consideration has to be given to the fact

that in China the average temperature in summer is relatively higher, while in winter relatively lower, and that at times the effect of a particularly strong cold wave would occur. On the other hand, modification and adjustment are needed in reference to soils, vegetation cover, agriculture, and topography.

The general index we adopted in the East Monsoon region and Mongolia-Singkiang Plateau is the total sum of temperatures 9500°C, 8000°C, 5400°C, 3200°C, and 1700°C.

The Equatorial Belt includes Nan-sha Islands, located in the south of the southern boundary of winter fronts, with a temperature sum of approximately 9500°C. There is very little temperature change throughout the year. The condition of energy is suitable for the growth of various kinds of tropical plants.

The temperature sum in the tropical belt is appsoximately between 8000°C and 9000°C. The temperature remains high in every season; in the coldest month it is above 16°C, while the average of extreme low temperatures for many years is not below 5°C, and there is no record of a temperature falling down below 0°C. The main vegetation cover in the lowland is the tropical seasonal rain forest, and economic crops which are basically composed of species of trees of camphor, lichi nut, Tao-king-lian, mulberry, wu-huan tze, and beans. There are few coniferous trees. All other economic crops which need more heat for growing such as coconuts, rubber, betel nuts, coffee, pinapple, and the like, can grow. Rice can be harvested three times a year. Sweet potatoes may be planted in winter, although temperature conditions are unfavorable for winter wheat growing. Soils of the lowlands are red laterite.

The temperature sum in the Sub-tropical belt is approximately between 8000°C, with the coldest monthly temperature from 0°C to 16°C. Natural vegetation includes seasonal rain forests of the Sub-tropical belt, monsoonal evergreen broad leaf forests and deciduous forests mixed with evergreen broad leaf forests. Among them exist tropical species and temperate species and coniferous species are also commonly found. The economic tropical crops cannot grow, at least not normally. In many places special economic products are citrous fruits, tea, rape seeds, tung trees, two harvests of rice, and winter wheat. In the southern part of this sub-tropical belt, there are also bananas, pinapples, lichinuts, cinamon nuts, olives and various other tropical crops. Soils of this region consist of red soils, yellow soils and yellow brown soils.

The temperature sum in the temporal belt is about

4500°C to 3200°C with a high temperature in summer, and which has almost no distinctive difference from that of sub-tropical belt. Therefore yearly crops such as cotton which need more heat, can grow very well, except in places near the northern boundary. The temperature in winter is low with the coldest monthly temperature from -8°C to 0°C. Seasonally frozen soil is found with short duration of frost which reaches 1 meter in depth. Wherever more moisture is found, natural vegetation cover consists essentially of deciduous broad leaf forest. There is no evergreen forest, citrous fruits, tea, rape seeds, tung trees nor other sub-tropical tree species. Wheat in most parts is grown in winter with two or three harvests a year. In a few places there is only one harvest yearly. Fruits such as apples, pears, persimmon, grapes, and the like, are of good quality. In the lowland region, the soils include brown forest, dark brown, black and brown desert soils.

In the Temperate belt, while the sum of temperatures is about 3200°C to 1700°C, the temperature in the summer is considerably higher, and many crops, such as rice, kaoliang, corn, jute can grow in most places. Wheat, beans, and kaoliang thus become variable crops in different regions. Beets can also grow well. The winter temperature, however, is very low (the coldest monthly temperature ranges between -8°C and -24°C), and furthermore, the cold season is very long. It is unfavorable for growing cotton and winter crops (special treatment has to be provided for planting winter wheat, apples, pears, grapes and other fruit are only found in the south, and apparently the quality is unequal to those grown in the temperate zone. Natural vegetation in the humid region consists of coniferous trees and a mixed forest of deciduous and broad leaf trees. Grassland and dessert are also found. In winter, soils can be frozen as deep as 1.0 to 2.0 meter, and there are even a few places of permafrost. Soils include podzolic brown forest soils, chernozems, and chestnut and grey desert soils.

In the Cold Temperate belt, the sum of temperature is approximately below 1700°C. It is much colder in winter with a very long period of cold season. Rice, kiaoliang, jute and other crops cannot grow. Fruits such as mentioned above have completely disappeared, and only wheat, potatoes, oats, and ku-tze may be reluctantly grown. Natural vegetation is the bright deciduous pine forests. Soils are a kind of acid podzolic soil. The layer of permafrost is found scattered around.

All the above-mentioned belts and sub-belts are in the

monsoon area of eastern China and within the area of the Mongolian-Sinkiang Plateau belt and sub-belt. In the Tibetan Plateau, the sum of the temperature, except for some local areas, remains below 2000°C, and even below 1000°C in many parts. A few mountain peaks are above the snow line. Should the energy belt be so divided, regularity of distribution is not horizontal but vertical. In this Plateau, sunshine is stronger but annual temperature difference is rather small. The summer temperature is low and the winter temperature is mild, and the definite numerical value of the temperature sum is very high in comparison with other natural regions of the same type of natural vegetation. Now the elevation above sea level of the upper line of cultivated land is used tentatively as a reference index for energy belt classification. The area around 4000 meters is the warm temperate belt, and between 4000 and 4200 is the sub-tropical belt.

IV. In a natural region, the combination of conditions of energy and of moisture are about the same, and soils, vegetation, land utilization, etc. have certain common characteristics. This natural region may be a naturally defined territory, or a group of natural provinces. A concrete classifying process is based upon moisture conditions in energy belt or sub-belt for classifying regions such as humid, semi-humid, semi-arid, and arid regions. Here is a general explanation for characteristics of the four regions.

1. Humid region - Natural vegetation is forest and the soil lacks calcium and contains little humus and mineral nutrients. With a degree of aridity below 1.0. There is a stable agricultural harvest under favorable conditions of energy, land form, and drainage. When the annual average rate of change of precipitation is below 20% in general, few droughts occur. In regions of sub-tropical belt and southward, however, the source of energy cannot be fully utilized because of a decrease in precipitation in certain seasons.

2. Less humid region - Vegetation consists of steppe forest, prairie, steppe and dryer shrub forest. In the Tsinghai-Tibetan Plateau, there is a mixed type of "prairie" and forest and prairie with scattered steppe localities. Some part of the soils contain lime accumulations and some places present alkaline soils. Humus is generally richer than in the other three types of regions. There are plentiful mineral nutrients. The degree of aridity may reach as high as around 1.5. Agricultural harvest is rather stable under suitable conditions of energy, land form, and drainage.

Average rate of change of precipitation is above 20%. Frequency of drought is rather high with an occasional serious drought, particularly a spring drought.

3. Semi arid region - Main vegetation is dry steppe. In the Tsinghai-Tibetan Plateau, it is a mixed type of "forest, prairie, and prairie-steppe," and steppe with scattered prairie. Soils contain in general a layer of lime accumulation. Alkaline soil is common, and the degree of aridity may reach 2.0. With irrigation, the agricultural harvest is unstable, and soil erosion and dust bowls may easily occur. Land utilization is chiefly grazing. Overgrazing, however, also causes soil erosion and dust bowl.

4. Arid region - Vegetation is desert grass and desert. Under favorable conditions of energy, land form and drainage, without irrigation, there is no agriculture. Only in a few places located in front of the mountains with more water or places with adoption of particular farming method (such as sand fields in Kansu) agricultural products may grow without irrigation.

Regions classified on the basis of the above mentioned peculiarities are actually types, in different energy belts, classified regions become individual units.

There is only one humid region existing in the cold temperate belt in China.

In the Temperate belt, from east to west, there are the humid, semi-humid, and semi-arid and arid geographical regions. The humid and semi-humid geographic regions exist in the eastern monsoon region of China; while semi-arid and arid geographical regions exist in Mongolian-Singkiang Plateau. The geographical region is the largest in area among the four geographical regions which form about one half of the total belt. Natural and agricultural characteristics of the various geographical regions are basically consistent with the various indexes of the first rank regional classifications mentioned above. The degree of aridity of the western boundary of the humid geographical region is rather low, which is below 0.75, while that of places in the eastern lowland (such as in the Singkiang Plain) is as high as about 1.00. The reason that we include these areas into the geographical region is that in spring when the temperature ranges from 5°C to 10°C, there is more precipitation and that precipitation constitutes a smaller percentile of the yearly sum. In fact the degree of humidity is higher than what is indicated by the degree of aridity. In addition, the western end of the arid geographical region is similar to that of Soviet

Central Asia. It is humid in spring and dry in summer, and short term vegetation is in a favorable situation, in contrast to any other area. This portion and points to the east are therefore classified into two separate sub-geographical regions, namely, eastern and western sub-geographical regions.

There are also the four humid, less humid, semiarid and arid geographical regions in the warm temperate belt. In the eastern monsoon area of China, there are humid, the less humid, and semiarid geographical regions. Only the arid geographical region is found in the Mongolian-Singkiang Plateau, and the semi-arid and arid geographical regions, in the Tsinghei-Tibetan Plateau. Due to the peculiar situation of the Tsinghai-Tibetan Plateau, we call it the semi-arid and arid geographical regions of Tisinghai-Tibetan Plateau, instead of the warm temperate belt. In the warm temperate belt of the eastern monsoon region in China, the classification of the humid and semi-humid geographical region is in accordance with the above mentioned peculiarities. The boundary drawn between the semi-humid and semi arid geographical regions is based upon the boundary between chermozem and brown soil and between grassland and forest-steppe, which is not fully consistent with the numerical value of the degree of aridity. The arid geographical region of the warm temperate belt in the Mongolian-Singkiang Plateau is partly bounded by the boundary between the Mongolian-Singkiang Plateau and the Tibetan Plateau, and partly by the boundary between the temperate and the warm temperate belts.

Except for the part of the Tsinghai-Tibetan Plateau, all land in the sub-tropical belt of our country is of the humid geographical region according to the criteria of the first rank of this classification. West of 103°E, however, the southwest monsoon is the chief cause of the climate. Winters are dry. Thus in some valleys natural vegetation is grassland instead of forest because of the influence of the foehn wind. Therefore, we classified this part as the western sub-geographical region, and the area east of 103°E as the eastern sub-geographical region. All areas in the tropical belt in China belong to the humid geographical region, which may also be divided into the two areas of an east and west sub-geographical region, according to the principles stated above. All land in the Equatorial belt in China is of the humid ti-chu.

According to its vegetation, the Tsinghai-Tibetan Plateau is divided into the three geographical regions of

semi-humid, semi arid and arid. In the semi-humid geographical region climate changes with elevation, as well as land form, and there are humid valleys with forest and steppes dominated by Sun grass and Tai grass, containing numerous crawing cushion like species and species with tiny leaves and dense hair. But the essential type of vegetation is the upper group of tall herbaceous species. Vegetation in the semi-arid geographical region is commonly bunch-like grass with the main species as Fesluca Ovina, and Avena Tibetica. Coniferous forests are found in a few areas. The boundary on the map between the semi-arid geographical region and the semi-humid geographical region is also that between the warm temperate and sub-tropical belts. Vegetation in the arid geographical region is all desert.

V. The second rank of the classification of the composite natural region is the natural geographic belt and sub-geographic belt. Each geographic belt contains soil characteristics differing in horizontal surfaces and characteristics of vegetation cover. The so-called typical soil represents a kind of "self developed soil." Representative vegetation cover refers to the natural vegetation grown on the plain with good drainage and soil of good texture. Regions with characteristic soil and vegetation cover have a combination of definite energy and water, as far as climate is concerned. Within one region there must be a similar soil vegetation and a similar vertical regional structure. Natural processes and natural phenomena, such as gradational forces, ground water and surface water, and biological factors, etc. are mostly alike. Soil types and vegetation cover in part of a region may again be divided up into soil sub groups and vegetational sub-types, which will make a region classified as a sub-geographic belt. Among the 18 regions and sub-geographic regions, there are 10 regions and sub-geographic belts (See appendix table for the terms). Classification of geographical belts and sub-geographic belts in the rest eight regions may briefly be stated as follows:

Semi-humid geographical regions of the temporal belt are divided into two geographic belts: temperate forest steppe with decayed black soils, and temperate grassland with black soils. The boundary between these two is mainly decayed black soil and black soil. East of this boundary, there is no lime accumulation, nor alkaline soils basically. This boundary is in general consistent with the boundary between forest grassland and grassland, as well as with the isorithm of 1.0 degree of aridity. This particular boundary

is also close to the western border of the alluvial upland, in the eastern part of the Northeast Plain. In forest grassland with decayed black soils with a degree of aridity of 1.0 or below, water holding of soils is rather high. The threat of spring drought is not imminent and is alkaline soil is only partially found. In grassland-black soils with degree of aridity above 1.0, there is a rather low humus content in the soil and it is also low in water holding power with frequent drought. There is wide distribution of alkaline soils with sand storm disaster.

In the temperate belt, the semi-arid geographic region may be divided into the geographic belt of dry steppe with dark chestnut soil. The boundary between these two is drawn on the basis of its difference in soil distribution. The dry steppe of dark chestnut soil with a degree of aridity of 1.2 to 1.5 with dense vegetation cover makes good pasture. The amount of hay yield by each mou is double that of dry steppe with light chestnut soil. Without irrigation, regional production power remains steady, even through a long period of years. Steppe with light chestnut soils has lighter vegetation with a low yield of hay and a degree of aridity between 1.5 to 2.0, and if it is cultivated without irrigation, a rapid decrease of fertility results with an unstable harvest.

The three geographic belts located in the sub-geographic region of the arid area in the temperate belt are the geographic belts of desert grassland with brown calcareous soil, and desert with gray brown desert soil. They differ in vegetation, soil and degree of aridity. In grassland with brown calcareous soil, although it is mainly early growing shrubs and semi shrubs, there is vegetation of herbaceous species, humus content consists of 0.5% to 1.5%, apparent lime accumulation are found, there is no clear sodium nitrate, the degree of aridity is below 4.0, and many areas can be used for grazing. In the geographical belt of desert with grey brown desert soil, it is all shrubs and semi-shrubs exclusively, with scanty distribution. The amount of humus is below 0.5%, without clearly divided horizons, there is no apparent lime accumulation, there is clear sodium nitrate and the degree of aridity is above 4.0 and only a few places can be used for grazing. In the irrigated area, the rate of effective evaporation is lower than that in the geographic belt of desert grassland with brown calcareous soil. The boundary between these two, drawn from the basic data on soil, vegetation, and degree of aridity is not far from actual situation. As to the desert grassland in front of the mountains

with grey calcareous soil zone, because of its location, humidity is higher and the degree of aridity is between 1.8 to 3.5. Vegetation is more herbaceous than in the above two zones. There is 1.5% to 2.5% of organic matter contained in soil. It thus has a higher value for grazing than the two stated above. Some places can even grow crops without irrigation. The rate of effective evaporation is higher than that in the above two zones. The boundary between this geographic belt and the other two belts is hypothetical.

The western sub-geographic region of the temperate arid geographic region is divided into the geographic belt of desert grassland with brown calcareous soil and the geographic belt of foreland desert grassland with grey calcareous soil. The latter has a higher temperature than the former. There is a larger percentage of spring precipitation with more species of vegetation of the southern central Asian type. Soil profiles are not very clear.

The semi-humid geographic region in the warm temperate belt is divided into the geographic belt of semi-arid deciduous broad leaf forest with water leached brown soil, and the geographic belt of semi-arid deciduous broad leaf forest and forest steppe with brown soil. They are distributed on the horizontal land surface with reference to climate and agricultural data. In the brown soil area, there is a larger degree of aridity and apparent spring drought. The possiblity of severe drought is high. Sulphate in the soil is not washed away. There is an obvious accumulation and alkalinization is rather evident.

The eastern sub-geographic region of the sub-tropical humid geographic region is divided into three geographic belts. The geographic belt of mixed deciduous broad leaf forest and evergreen broad leaf forest with yellow brown soil and yellow dark brown soil is a transitional area with a shorter season of higher temperatures in comparison with those in the geographical belt of central sub-tropical evergreen broad leaf forest with red soil and yellow soil. The temperature is low in winter, and the sum of temperature is generally below 5000°C, which is insufficient for growing citrus fruits, tung trees, other tree crops, and double-crop rice, though it is suitable for winter wheat. The distribution of the broad leaf trees is scattered with only a few varieties of them. In the south of this region, the evergreen broadleaf forests can be found. Due to less favorable moisture conditions in comparison with the Central sub-tropical belt, the growth of fir, ma-wei, pines and other kinds of trees is not as rapid as in the

central sub-tropical zone. Soils are of yellow grey or yellow brown consisting of a greater quantity of mineral nutrients than that in the central sub-tropical belt. The boundary was drawn according to conditions of soil, vegetation, agriculture and climate. The temperature sum of the geographic belt of broadleaf -- evergreen vegetation with red and yellow soils in the central subtropical belt exceeds 5000°C, with a long warm season and a high temperature in winter, with vegetation representing the ever green and broadleaf forest of the level geographic belt. Energy with high relative humidity can fully meet the requirements for growing citrus fruits, tung trees and double crop rice. And cloudy weather in winter meets requirements for growing tea and rape seeds which are more important than in other geographic belts. The position of winter wheat and cotton in agriculture is less important than in the northern sub-tropical belt. Firs and Ma-wei Pines grow rapidly, but many other economic crops and trees that need a high temperature for growing, such as lichee, lun-yen, cotton, ya-chao-tree and the like cannot grow or can only poorly grow, because of poor soil condition. The boundary between this geographical belt and the southern sub-tropical belt may be drawn mainly on the basis of vegetation, and agricultural and climatic conditions.

The sum of temperatures in the southern sub-tropical belt of the geographical belt of evergreen broad leaf forest with red lateritic and yellow soil not only exceeds 6000°C with a high winter temperature but is also snowless all year around and with occasionally low temperature. Thus tropical fruits which cannot be grown in the central sub-tropical belt play an important role in the agricultural economy. Humidity is lower than that of the central tropical belt. The firs does not grow as well as Ma-wei Pines. The content of natural vegetation is rather complicated. The soil is similar to that of central sub-tropical belt except for yellow soil occupying a small area.

Two geographic belts may be classified in the semi-arid geographic region of the Tsinghai-Tibetan Plateau: The geographic belts of forest, steppe, and prairie-steppe, located at the northeastern border of the plateau. There are a number of mountain ranges with much water vapor, and thus a semiarid forest can grow. The main natural vegetation on the plain and the lower area is of prairie steppe. Due to its location and relation to elevation, there is less water vapor sent in, and because of the strong wind and low temperature it is unfavorable to the growth of trees. There are only mixed prairies and steppes distributed here.

The two geographic regions ti-tai both of the Tsinghai-Tibetan Plateau and the arid geographic region are desert areas. In the high cold desert the occurence of a desert in a flat area is caused not only by elevation, but also by extreme cold and strong wind. Even if there was more water, it would be still insufficient to change the outlook of the desert. The reason for the existence of desert in a flat arid geographic region is mainly insufficient moisture, though there is also insufficient heat. Should there be sufficient moisture, not only the vegetation can be transformed into grassland or forest, but also agricultural crops may be grown within the limit of temperature conditions.

VI. The classification of the third rank natural province is based upon the difference of the physiologic climate within the geographic region itself, which is often consistent with certain land form units. In some areas, land form is the main factor determining the local difference. A classification of the physiological climate is of primary necessity, therefore, the following is a preliminary plan:

1. Plains and rolling plains
2. Hills (relative altitude smaller than 200 meters)
3. Low mountains (relative altitude between 200-500 meters)
4. Mountain areas with valleys or distinctive plains between mountain ranges (not less than 20 percent of the total area)
5. Mountain area with clear vertical distribution of geographical belts but with only one geographical belt, or sub-geographical belt dominating the whold region (relative altitude below 500 meters)
6. Mountain areas with clear vertical distribution of geographical belts but with two or more geographic belts or sub-geographic belts, or occupying the dominant position in the whole region (relative altitude above 500 meters)
7. High mountains and high plateaus with summit close to or above snow line (relative altitude above 500 meters)

These seven types of landform may be classified into four categories:

The first category, plains and hills, includes types 1 and 2, which, due to the small differences of macroclimate caused by landforms, may be discarded. The differ-

ences in intermediate climate caused by landforms is more obvious in 2 than in 1. The difference in microclimate may be seen more in 2 than in 1 with varying degrees in different places.

The second category, low mountains, includes type 3, which is characterized as having a less obvious difference in macroclimate than in the intermediate climate, where both are caused by land forms.

The third category, plains between mountain ranges, includes type 4, charachterized as having obvious plains between mountain ranges and basins. Their natural conditions may be used as the main basis for classifying horizontal natural regions on the one hand, while on the other hand they make a difference in land utilization.

The fourth category, medium and high mountains, includes types 5, 6, and 7 with the common element being that the difference in macroclimate caused by landforms induces obvious differences in soils and natural vegetation.

We have thus considered an altitude of 500 meters as a rather significant standard for classification, as a result of examining natural phenomena and regulations of various aspects.

A definition for a "natural province" may be stated as: a natural region is an area within which the characteristics of physiological climate vary because of different landforms or geographical locations. Each natural province is noted as having basic similarities between the characteristics and the form of their composition of the physiological climate. Soils and natural vegetation are consequently similar. From a physiological viewpoint, the landforms are thus classified as one type.

VII. The functions of composite natural regions are very wide:

First, on the basis of the national composite natural region it is possible to understand systematically which region may produce what goods, for which major products land should be used, and in view of different technical conditions how much production may be acquired in the region. The regional classification helps us to secure methods of land utilization; for instance, the humid region is used for mainly agriculture, mountain ranges and hill country for forest. But the humid region of the cold temporate zone is not favorable for agriculture even in plain areas, due to infertile soils and meager energy. Meanwhile in the tropical and equatorial regions, humid areas not even in plain may grow tropical economic crops.

In the semi-humid region, is the major grazing region. Meanwhile, agricultural products are of secondary importance. Only in irrigated areas, is agriculture a major branch of production. Forestry is limited to higher mountain ranges. The quantity of agriculture in the arid region is determined by the quantity of surface water, introduced from the outside, and that of underground water. Grazing is confined to areas close to the semi-arid region, foreland areas, and the lower part of mountain slopes and alpine meadows. Forestry occupies only a part of mountain areas.

Second, for the purpose of better utilization of land, of eliminating natural unfavorable factors, and of making certain technical arrangements for regional development, it is desirable to give consideration to natural geographic regions, natural geographic belts and natural provinces, in weighing their degree of urgency. The northern part of a region, for instance, usually suffers disasters from cold weather. Such practices as using dried hay, flooding, mulching and building frost shelters for protection from cold weather are very useful. For irrigation in humid areas in general, the problem of accumulating alkali in soils may be disregarded; however, it should be given more attention in less humid regions. But the problem as such must be viewed with importance in semi-arid regions. In some dry areas, prevention of alkalization is rather easy because of the depth of ground water table. The problem of applying fertilizers also varies in treatment in accordance to different regions.

Third, classification of composite natural regions also has a certain effect upon the expansion of advanced experience in techniques of agriculture, forestry, and grazing. Any specific technical arrangement is suitable only under certain natural conditions. An effective method which has been experienced and proved in one locality sometimes fits in to different regions of the same energy belt; sometimes only in one geographic region or sub-geographic region, geographic belt or sub-geographic belt, a natural province, natural area, or even a natural section.

In summing up these experiences, their relationships with natural conditions should be thoroughly analyzed, before a conclusion can be made as to the extent of the scale of operation and the extent of utilization.

In our classification of the natural region and the energy belt, the principles and methods are based upon the consideration of the whole world and the whole Asia. Therefore, they may be basically applied to anywhere else in the

world. It thus becomes possible to absorb after evaluation and analysis, any advanced foreign contribution in the field of natural historical science and in techniques of agriculture, forestry and grazing.

Fourth, a wide establishment of agricultural and forestry experimentations, botonical gardens, natural conservation areas and biogeographical stations will become an essential aspect of our scientific research. Designs for these organizations, if planned on the basis of composite natural regions, may help in drawing suitable plans.

Fifth, a large scale area development often involves numerous units of a composite natural region. Changes made in one natural condition quite often affect the whole. With reference to the composite natural region, research, calculation and plans may proceed in accordance with the classified unit area.

Scientifically speaking, (1) classification of a composite natural region is one of essential foundation for the development of physical geography; (2) through classification, an understanding of nature, distribution and various natural functions of phenomena can be better achieved, even though natural historical data are found to be unbalanced in our country; (3) while making an analytical summary of data on various natural factors with reference to each classified composite natural unit area, generalizations may be secured that may not be achieved otherwise through research on separate aspects of natural phenomena.

Table 1

[illegible]

[Column one]
Natural region
1. Per cent of total national area
2. Main factor determining differences of natural region
3. New structural movement and topography
4. Climate
5. Hydrography
6. Surface gradational forces
7. Soils
8. Natural vegetation
9. Species of plants
10. Inherited factors

11. Human factors
12. Direction and problems of land utilization

Column two

(1) Eastern monsoon region (part of Asiatic monsoon area)

1. 46.0%
2. Regional differences of energy and temperature which vary with latitudes
   (In areas north of the Ching-ling range and the Huai River, difference of humidity changing with distance to the sea is also a rather significant factor)
3. In general, the extent of the uplife of the structural movement is not great. In areas east of Chin-chow, Cheng-chow, Peking, and Ou-pu, most areas are below 1000 meters and are of mainly of alluvial origin. Areas below 500 meters form large percentage. Huge depositional plains are found.
4. Distinctive influence by summer monsoon with higher humidity.
5. Rainfall is the main source of surface water, abundant ground water.
6. Normal weathering; fluvial erosion, deposition, and solution; along sea coast, there is wave erosion and deposition; freezing destruction in high altitudes and latitudes; sand storms and aeolean transportation and deposition in some places.
7. In comparison with the other two regions, soils in this region have developed a better profile, with smaller textures, a higher humus content, and less soluble salts. Areal differences within this region are great.
8. Mainly forest, partly grassland.
9. Species of vegetation suffered little destruction from the Quaterary Glaciation. There are a great number of species and they are intermixedly distributed.
10. Due to the small extent and intensity of Quaterary Glaciation, species of fauna and flora are very rich. Some from the later portion of Cenozoic and Tertiary species are still preserved. Weathered ancient red materials widely distributed, especially to

Table 1, continued:

/ Column two continued /

11. Man's influence is profound and extensive. All cultivable areas have been brought under cultivation. Natural forests have been mostly destroyed. Soil profile has been mostly eroded or destroyed. Microclimate, hydrography and small landforms have also been changed by man's activities.
12. The most essential agricultural region of our country. Chemical treatment, hydraulic utilization, and electrification have been gradually introduced in cultivation. Most of the area is mountain ranges and hills. Forestry should be developed on a large scale. Grazing and livestock industry should also be enlarged.

/ Column Three /

(2) Mongolian-Singkiang Plateau (Part of Eurasian grassland desert area)

1. 27.3 %
2. Regional differences in humidity, which changes with distances to the sea.
3. Distinctive differential uplifting movement. Plains above 1000 meters with mountain ranges lying across them.
4. Arid and semi-arid.
5. Most parts belong to interior drainage system with surface water formed by rain; water is mostly a temporary phenomenon; plenty of lakes. Mountain streams, formed by melting of snow, are the main water supply source which is the most important resource in this region. Not rich in ground water.
6. Weak weathering, fluvial erosion and deposition, extensive wind drosion, transportation and deposition. In mountains, glacial eorsion and deposition are common.
7. Coarser texture, limited amount of humus, and high content of soluble salts.
8. Mainly desert, partly desert-steppe and arid steppe. In high mountain region, there are forests and alpine meadows.

9. Since the last part of Cenozoic era, arid and semi arid climate has prevailed. Vegetation confined to dry types, with very few species.
10. Due to weak gradational forces, land forms caused by faults and other tectonic forces are fairly well preserved. There was a period of humid climate prevailing during the Quarternary epoch. In some places the ancient drainage system was well developed. The relics of Quarternary glaciers can be seen in areas above 3,500 meters.
11. Man's influence is relatively limited; only in Inner Mongolia, Ninghsia, and areas where water from high mountains can be used for irrigation, is man's influence relatively high.
12. Agriculture is developed in irrigated districts. Grazing in dry steppe and desert steppe. Mountainous areas suitable for forestry and grazing. The major problem of this region is the conservation of water resources. The second problem is to stablize sands and prevent accumulation of alkali in soils.

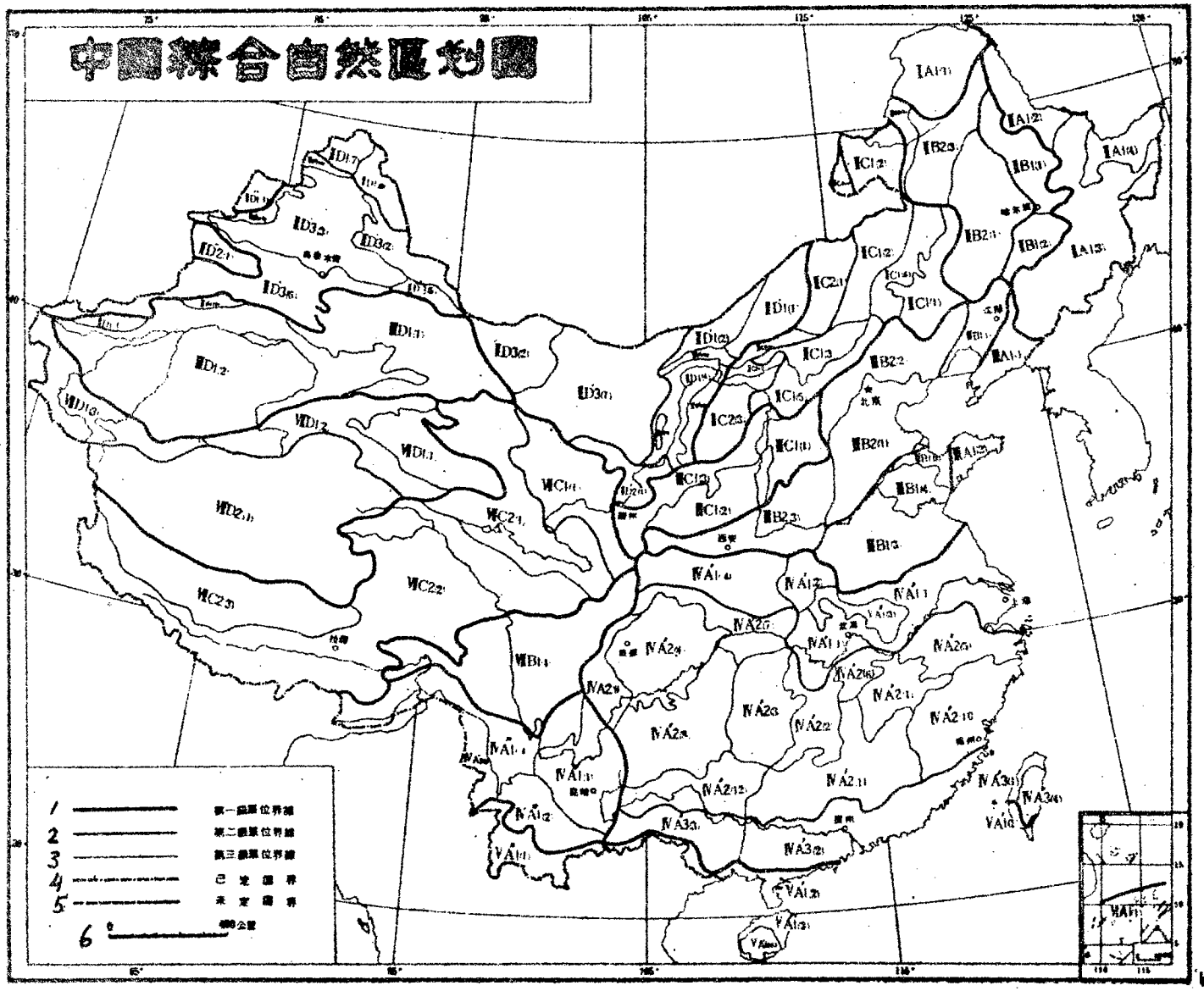
/Column Four/

(3) Tsinghai-Tibetan Plateau region

1. 26.7%
2. Characteristics of a vertically distributed region which changes with altitude.
3. Large scale of recent uplift; locally there are differential uplifts. The largest plateau in the world, with altitude of over 4000 meters above sea level. There are numerous high mountains which stand above snow line.
4. Scanty air, low temperature. Strong solar radiation. Small precipitation, strong wind.
5. Mostly interior drainage system; numerous glacier and lakes.
6. Physical weathering and material movement are strong. Glacial and fluvial transportation and deposition.
7. Due to weak chemical weathering texture of

parent materials is coarse. Soil profile poorly developed.

8. Mainly desert and steppe; forest found in mountains and valleys.
9. Formed during the process of uplifr of land after the Quarternary Glaciation. There is little relation of vegetation to that of Mongolian-Singkiang Plateau, and very few species of vegetation.
10. Extensive distribution of relics of Quarternary Glaciation.
11. Very little influence of man.
12. Mainly grazing; in a few places agriculture and forestry may be developed. Chief problem is first, insufficient energy; second, insufficient moisture; third, strong wind; and the last, a thin layer of soils with coarse texture.



7 中国国界根据解放前申报地图绘制

Map

Complex Natural Regions of China

1. Boundary of first rank unit
2. Boundary of second rank unit
3. Boundary of third rank unit
4. International boundary (demarcated)
5. International boundary (undemarcated)
6. 0 / / / 400 km.
7. China's international boundary as based on Shen-pao Atlas published before Liberation.

Classified Units of China's Complex Natural Regions

/Column One/

I. Cold Temperate Belt
  IA. Humid Geographic Region
    clear coniferous forest - Podzols
    IA1(1) northern Greater Khingan Mountains
II. Temperate Belt
  IIA. Humid Geographic Region
    Mixed coniferous and deciduous broad leaf forest-Podzolic forest soils
  IIA1 (1) Three River Plain
    (2) Northern Lesser Khingan Mountains
    (3) Eastern mountainous region of Manchuria
  IIB Less Humid Geographic Region
    Forest-steppe decayed chernozems
    IIB1 (1) Northern part of foreland plain of east Manchuria
      (2) Southern part of foreland plain of eastern Manchuria
    Grassland-chernozems
    IIB2 (1) Central plain of Manchurai
      (2) San-ho foreland hills
      (3) Central Greater Khingan Mountains
  IIC Semi-arid Geographic Region
    Dry steppe-dark chestnut soils
    IIC1 (1) Eastern mountain foot hills and plains of Greater Khingan Mountains
      (2) Hu-lun-Hsi-lin eastern high plain and hills
      (3) Chi-ning--to-lun high plain and hills